



Pre-Algebra Workbook Solutions

Factors and multiples

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MATH

DIVISIBILITY

- 1. What are the whole numbers that divide into 49?

Solution:

1, 7, 49

- 2. What are the whole numbers that divide into both 45 and 50?

Solution:

1 and 5

- 3. How can you determine if a number is divisible by 5?

Solution:

If a number ends in “0” or “5,” it’s divisible by 5.



■ 4. “Divisibility” of whole numbers means we’re looking at numbers that divide into a number _____.

Solution:

evenly

■ 5. What is the smallest whole number that’s divisible by both 3 and 5?

Solution:

15

■ 6. What is the smallest whole number larger than 20 that can be divisible by 2 and 4?

Solution:

24

■ 7. What is the smallest whole number larger than 50 that’s divisible by both 3 and 5?



Solution:

60



MULTIPLES

- 1. List the first four multiples of 8.

Solution:

8, 16, 24, 32

- 2. List the first five multiples of 40.

Solution:

40, 80, 120, 160, 200

- 3. Is 8 a multiple of 8? Why or why not?

Solution:

Yes, because $8 \cdot 1 = 8$.

- 4. What are two common multiples of 2 and 3?



Solution:

6 and 12

■ 5. What are two common multiples of 5 and 10?

Solution:

10 and 20

■ 6. Complete the statement.

30 is a multiple of 5 because $5 \cdot \underline{\hspace{2cm}} = 30$.

Solution:

6

■ 7. Complete the statement.

The concept of multiples is related to the concept of .



Solution:

divisibility

■ 8. Complete the statement.

56 is a multiple of 8 because $56 \div 8 =$ _____.

Solution:

7



PRIME AND COMPOSITE

- 1. Prime numbers are numbers that are only divisible by _____ and themselves.

Solution:

1

- 2. _____ numbers are numbers that are divisible by numbers other than 1 and themselves.

Solution:

Composite

- 3. Is 7 a prime or composite number?

Solution:

Prime



■ 4. Is 15 a prime or composite number?

Solution:

Composite

■ 5. 35 is a composite number because it's divisible by which numbers?

Solution:

1, 5, 7, and 35

■ 6. 98 is a composite number because it's divisible by which numbers?

Solution:

1, 2, 7, 14, 49, 98

■ 7. By how many numbers will a prime number be divisible?



Solution:

A prime number will only be divisible by two numbers: 1 and the number itself.

■ 8. Complete the statement.

We know that 16 is a composite number because not only is $16 \div 1 = 16$ and $16 \div 16 = 1$, we also know that $16 \div 4 = 4$, $16 \div 2 = 8$, and $16 \div 8 =$ _____.

Solution:

2



PRIME FACTORIZATION AND PRODUCT OF PRIMES

■ 1. What is the prime factorization of 75?

Solution:

75

$3 \cdot 25$

$3 \cdot 5 \cdot 5$ or $3 \cdot 5^2$

■ 2. What is the prime factorization of 55?

Solution:

55

$5 \cdot 11$

■ 3. What is the prime factorization of 148?

Solution:



148

$2 \cdot 74$

$2 \cdot 2 \cdot 37$ or $2^2 \cdot 37$

■ 4. Fill in the missing value.

The prime factorization of 156 is $2 \cdot 2 \cdot 3 \cdot \underline{\hspace{2cm}}$.

Solution:

The product $2 \cdot 2 \cdot 3$ is equal to 12, and $156 \div 12 = 13$, so the missing value is 13.

■ 5. Fill in the missing value.

The prime factorization of 63 is $3 \cdot 3 \cdot \underline{\hspace{2cm}}$.

Solution:

The product $3 \cdot 3$ is equal to 9, and $63 \div 9 = 7$, so the missing value is 7.



■ 6. Prime factorization is when you break down a composite number into its factors until every factor is a _____ number.

Solution:

prime



LEAST COMMON MULTIPLE

- 1. Find the least common multiple of 3 and 15.

Solution:

The multiples of 3 are 3, 6, 9, 12, 15, 18, etc., and the multiples of 15 are 15, 30, 45, 60, etc. The smallest matching multiple in these lists is 15, so 15 is the least common multiple of 3 and 15.

- 2. Find the least common multiple of 16 and 40.

Solution:

The multiples of 16 are 16, 32, 48, 64, 80, etc., and the multiples of 40 are 40, 80, 120, etc. The smallest matching multiple in these lists is 80, so 80 is the least common multiple of 16 and 40.

- 3. Find the least common multiple of the set {36, 84}.

Solution:



The multiples of 36 are 36, 72, 108, 144, 180, 216, 252, etc., and the multiples of 84 are 84, 168, 252, etc. The smallest matching multiple in these lists is 252, so 252 is the least common multiple of 36 and 84.

■ 4. Find the least common multiple of 12 and 20.

Solution:

The multiples of 12 are 12, 24, 36, 48, 60, etc., and the multiples of 20 are 20, 40, 60, etc. The smallest matching multiple in these lists is 60, so 60 is the least common multiple of 12 and 20.

■ 5. If the prime factorization of one number is $2 \cdot 3 \cdot 5^2$, and the prime factorization of another is $2^3 \cdot 3$, what's the least common multiple of the two numbers?

Solution:

Take the largest number of factors for each prime number in the prime factorizations. The first number has one factor of 2, while the second number has three factors of 2, so we'll take three factors of 2.

$$2^3$$



The first number has one factor of 3, while the second number has one factor of 3, so we'll take one factor of 3.

$$2^3 \cdot 3$$

The first number has two factors of 5, while the second number has zero factors of 5, so we'll take two factors of 5.

$$2^3 \cdot 3 \cdot 5^2$$

If we multiply this out, we'll find the least common multiple.

$$8 \cdot 3 \cdot 25$$

$$24 \cdot 25$$

$$600$$

■ 6. Is there only one possible pair of two numbers that can have a LCM of 20? Give examples to support your answer.

Solution:

No, there are multiple pairs of numbers that have a least common multiple of 20. For instance, 10 and 20 have an LCM of 20, but so do 5 and 4.



GREATEST COMMON FACTOR

- 1. The greatest common factor of two numbers is the _____ number that divides evenly into both numbers.

Solution:

largest

- 2. Find the greatest common factor of 110 and 48.

Solution:

Find the prime factorization of both numbers.

110

$2 \cdot 55$

$2 \cdot 5 \cdot 11$

48

$2 \cdot 24$

$2 \cdot 2 \cdot 12$

$2 \cdot 2 \cdot 2 \cdot 6$

$2 \cdot 2 \cdot 2 \cdot 2 \cdot 3$



The only factors that are common to both numbers is one factor of 2, so the greatest common factor is 2.

- 3. Find the greatest common factor of 100 and 75.

Solution:

Find the prime factorization of both numbers.

$$100$$

$$75$$

$$2 \cdot 50$$

$$3 \cdot 25$$

$$2 \cdot 2 \cdot 25$$

$$3 \cdot 5 \cdot 5$$

$$2 \cdot 2 \cdot 5 \cdot 5$$

The only factors that are common to both numbers are two factors of 5, so the greatest common factor is $5 \cdot 5 = 25$.

- 4. Find the greatest common factor of the set $\{124, 256\}$.

Solution:

Find the prime factorization of both numbers.



$$124$$

$$2 \cdot 62$$

$$2 \cdot 2 \cdot 31$$

$$256$$

$$2 \cdot 128$$

$$2 \cdot 2 \cdot 64$$

$$2 \cdot 2 \cdot 2 \cdot 32$$

$$2 \cdot 2 \cdot 2 \cdot 2 \cdot 16$$

$$2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 8$$

$$2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 4$$

$$2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$$

The only factors that are common to both numbers are two factors of 2, so the greatest common factor is $2 \cdot 2 = 4$.

■ 5. Find the greatest common factor of the set $\{54, 162\}$.

Solution:

Find the prime factorization of both numbers.

$$54$$

$$2 \cdot 27$$

$$2 \cdot 3 \cdot 9$$

$$162$$

$$2 \cdot 81$$

$$2 \cdot 3 \cdot 27$$



$$2 \cdot 3 \cdot 3 \cdot 3$$

$$2 \cdot 3 \cdot 3 \cdot 9$$

$$2 \cdot 3 \cdot 3 \cdot 3 \cdot 3$$

The only factors that are common to both numbers is one factor of 2 and three factors of 3, so the greatest common factor is $2 \cdot 3 \cdot 3 \cdot 3 = 54$.

■ 6. If one number has a prime factorization of $3 \cdot 5 \cdot 11$, while another has a prime factorization of $2 \cdot 3^2 \cdot 11^2$, what is their greatest common factor?

Solution:

The only factors that are common to both numbers is one factor of 3 and one factor of 11, so the greatest common factor is $3 \cdot 11 = 33$.

■ 7. If one number has a prime factorization of $2^4 \cdot 3 \cdot 11$, while another has a prime factorization of $2^3 \cdot 5$, What is their greatest common factor?

Solution:

The only factors that are common to both numbers are three factors of 2, so the greatest common factor is $2^3 = 8$.



■ 8. Is there only one possible pair of two numbers that can have a GCF of 16? Give examples to support your answer.

Solution:

No, there are multiple pairs of numbers that have a greatest common factor of 16. For instance, 16 and 32 have an GCF of 16, but so do 16 and 48.



